TABLE 1. U.S. DEFENSE FORCES (END OF FISCAL YEAR)

| Forces | 1964 | 1970 | 1975 | 1980 |
|---|---|---|---|---|
| Strategic Forces (in numbers of units) | | | | |
| Intercontinental ballistic missiles | 242 | 1,057 | 1,054 | 1,054 |
| Submarine-launched ballistic missiles | 336 | 656 | 656 | 656 |
| Strategic bomber aircraft (PAA) a/ | 1,160 | 469 | 396 | 376 |
| Air defense aircraft (PAA) a/ | 1,429 | 583 | 376 | 273 |
| General Purpose Forces (in numbers of units) | | | | |
| Active Army maneuver battalions b/ | 159 | 187 | 151 | 168 |
| Active fleet ships (includes MSC) c/ | 918 | 774 | 514 | 478 |
| Tactical fighter aircraft (PAA) a/ d/ | 2,656 | 2,820 | 1,958 | 2,606 |
| Total Manpower, Military and Civilian (in thousands) | 3,824 | 4,330 | 3,205 | 3,036 |

a/ Primary aircraft authorization, a measure of aircraft available to the operational commander.

b/ Includes airborne, airmobile, tank, infantry, ranger, and mechanized infantry battalions.

c/ Military Sealift Command.

d/ All services.

In general purpose forces, the United States was expanding its capabilities even before the Vietnam War, adding divisions, ships, and planes. After Vietnam, however, active divisions were cut; and tactical fighter aircraft levels declined by 31 percent between 1970 and 1975. The number of ships in the active fleet

shrank by a third, reflecting both the obsolescence of large numbers of ships built during the later years of World War II and a deliberate effort to reduce operations and maintenance costs by retiring ships earlier than originally planned (see Table 1). 1/

Consistent with the recent turnaround in new defense budget authority, the United States has embarked on a major modernization of its strategic forces, including construction of the Trident-class submarine, procurement of the Trident I missile and air-launched cruise missiles (ALCM), and modification of the B-52 bomber force to carry ALCMs. The United States is also developing its first mobile intercontinental ballistic missile (ICBM) system, the MX/Multiple Protective Structure system, and a more accurate Trident missile with a larger payload, the Trident II.

Similarly, major improvements to the general purpose forces have begun. The number of active Army maneuver battalions has increased by more than 10 percent since 1975. The number of ships in the active fleet only began to increase in the last three years, but the average displacement and ship-for-ship capabilities of new construction have increased steadily since 1975. A major tactical aircraft replacement effort is also well under way. F-14s, F-15s, and F-16s are replacing older fighter aircraft; the A-10 has been introduced as an attack aircraft; the F/A-18 program, to provide attack and lightweight fighter aircraft for the Navy and the Marines, has entered production; and the Congress has begun to fund procurement of the AV-8B vertical/short take-off and landing (V/STOL) aircraft for the Marine Corps.

Manpower levels in the Defense Department have followed the fortunes of conventional forces, rising during the 1960s and peaking toward the end of that decade. When conventional forces were cut back in the early 1970s, however, manpower levels fell even more sharply. Although a number of factors underlie this development, notably creation of a smaller, all-volunteer force, it mirrors the broad trend in the civilian sector, where

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1/ The naval shipbuilding programs of World War II, and the subsequent ability of the United States to maintain nearly a thousand ships in the active fleet, reflected the extraordinary expenditures of that period. Budget authority for defense programs rose to nearly $258 billion (in fiscal year 1982 dollars) by the end of World War II, and outlays reached almost 40 percent of GNP.

many activities are being carried out with less manpower than before. It remains to be seen whether current and future modernization of conventional forces will require an increase in manpower levels, however.

## THE CBO BASELINE: A PROJECTION OF FUTURE DEFENSE PROGRAMS AND BUDGETS

This report employs the CBO defense baseline as a measure of future defense budgets and as a benchmark for evaluating the effects on costs of alternative defense programs. The baseline is a projection, but not a prediction, of future defense budgets and forces.

The baseline incorporates Congressional action on the President's fiscal year 1981 defense budget, as reflected in the defense authorization and appropriation acts. Based on the implications of the 1981 defense budget, the baseline estimates investment and force structure costs for fiscal years 1982-1986. 2/

It is possible to construct a baseline estimate for 1982-1986 because the Department of Defense (DoD) must inform the Congress of its major investment plans for the next five years as part of each year's budget submission. Decisions made in the authorization and appropriations process for the current fiscal year can then be used to modify those investment plans to reflect likely Congressional intent in future years. Similarly, operating costs for future forces--which depend in part on delivery of equipment now being procured--can also be inferred from DoD plans and Congressional actions on the current budget. Thus, the CBO baseline is a program-oriented projection of future defense budget authority. (Appendix B provides additional detail on the baseline methodology.)

The CBO baseline assumes relatively constant force levels for fiscal years 1982-1986, with modest increases in the number of ballistic missile submarines, Navy warships, and Air Force tactical aircraft (see Table 2). It assumes continued modernization of the strategic forces and tactical aircraft, as well as procurement of the Army's new generation of equipment. Navy shipbuilding in the baseline averages 17 new vessels per year.

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2/ Investment costs include research and development expenditures and procurement of new equipment.

TABLE 2. MAJOR FORCES AND PROCUREMENT PROGRAMS ASSUMED IN THE CBO BASELINE, FISCAL YEARS 1982-1986

| Forces and Programs | 1982 | 1983 | 1984 | 1985 | 1986 | Total at End of 1986 a/ |
|---|---|---|---|---|---|---|
| Forces (number operational per year) | | | | | | |
| Strategic Forces | | | | | | |
| ICBM launchers | 1,054 | 1,054 | 1,054 | 1,054 | 1,054 | 1,054 |
| Strategic bombers | 376 | 376 | 376 | 376 | 388 | 388 |
| Ballistic missile submarines | 34 | 35 | 37 | 38 | 40 | 40 |
| General Purpose Forces | | | | | | |
| Land forces | | | | | | |
| Active Army divisions | 16 | 16 | 16 | 16 | 16 | 16 |
| Active Marine divisions | 3 | 3 | 3 | 3 | 3 | 3 |
| Army National Guard divisions | 8 | 8 | 8 | 8 | 8 | 8 |
| Reserve Marine divisions | 1 | 1 | 1 | 1 | 1 | 1 |
| Naval forces | | | | | | |
| Warships | 294 | 308 | 318 | 321 | 328 | 328 |
| Tactical air forces | | | | | | |
| Navy aircraft (PAA) b/ | 696 | 696 | 696 | 696 | 744 | 744 |
| Aircraft carriers | 13 | 13 | 13 | 13 | 14 | 14 |
| Air Force aircraft (PAA) b/ | 2,388 | 2,484 | 2,502 | 2,502 | 2,502 | 2,502 |
| Mobility forces | | | | | | |
| Aircraft | 802 | 802 | 802 | 802 | 802 | 802 |
| Ships | 16 | 16 | 16 | 16 | 16 | 16 |
| Procurement (units ordered per year) | | | | | | |
| Strategic Forces | | | | | | |
| Trident submarines | 1 | 1 | 1 | 2 | 0 | 5 |
| Trident I missiles | 72 | 72 | 72 | 54 | 0 | 270 |
| Trident II missiles | R&D c/ | R&D | R&D | R&D | 50 | 50 |
| Manned bomber | R&D | 12 | 33 | 48 | 48 | 141 |
| MX missile | R&D | 9 | 49 | 72 | 72 | 202 |
| KC-135s re-engined | 9 | 63 | 72 | 72 | 72 | 288 |
| General Purpose Forces | | | | | | |
| XM-1 tanks | 873 | 1,080 | 1,080 | 1,080 | 1,080 | 5,193 |
| IFV/CFV (fighting vehicles) | 600 | 617 | 1,080 | 1,080 | 1,080 | 4,457 |
| AH-64 helicopters | 14 | 78 | 96 | 96 | 96 | 380 |
| SSN-688 submarines | 2 | 2 | 2 | 2 | 2 | 10 |
| CG-47 cruisers | 2 | 4 | 3 | 4 | 4 | 17 |
| FFG-7 frigates | 4 | 4 | 4 | 4 | 2 | 18 |
| F-18 aircraft | 108 | 147 | 174 | 191 | 191 | 811 |
| AV-8B aircraft | 12 | 24 | 54 | 54 | 54 | 198 |
| F-16 aircraft | 180 | 180 | 180 | 180 | 63 | 783 |
| A-10 aircraft | 46 | 46 | 46 | 0 | 0 | 138 |
| KC-10 aircraft | 6 | 8 | 0 | 0 | 0 | 14 |
| C-130 aircraft | 8 | 0 | 0 | 0 | 0 | 8 |

a/ For procurement, the sum of units ordered between 1982 and 1986.

b/ Primary aircraft authorization, a measure of aircraft available to the operational commander.

c/ Research and development.

Under these assumptions, real growth in defense budget authority will range from 2.2 percent to 3.2 percent annually between 1982 and 1984 (see Table 3). The baseline projects a real decline in defense budget authority in 1986 because current publicly available DoD documents do not indicate replacements for those programs that will be completed by the mid-1980s.

TABLE 3. BASELINE DEFENSE BUDGET AUTHORITY, FISCAL YEARS 1981-1986 (In billions of dollars, annual percentage real increases in parentheses)

| | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|---|---|---|---|---|---|---|
| Baseline Budget Authority | | | | | | |
| Current dollars | 171.0 | 196.1 | 222.5 | 249.3 | 273.0 | 287.8 |
| Constant fiscal year 1982 dollars | 190.0 | 196.1 | 202.1 | 206.5 | 206.8 | 199.4 |
| Percentage Real Growth Over Preceding Year | -- | (3.2) | (3.1) | (2.2) | (0.1) | (-3.6) |

Investment in strategic forces accounts for most of the real growth in the baseline. Real funding for conventional forces is roughly constant, with increases for Army investment, Navy aircraft, and Air Force spare parts offset by declines in procurement of Air Force tactical aircraft when currently planned programs come to an end.

CBO's baseline grows substantially more slowly in real terms than the 5 percent rate proposed by President Carter. Thus, against this topline, and certainly against any higher topline, uncommitted budget authority would be available for additional improvements to U.S. defense capabilities. In 1985, for example, this margin represents 12 percent of the baseline. The following chapters illustrate some of the ways in which such a margin might be employed, estimating the costs of selected approaches to improving U.S. defense forces.

## CHAPTER III. STRATEGIC FORCES

Budgets for strategic nuclear forces will again be an important issue in fiscal year 1982. These forces include both offensive and defensive systems, as well as command, control, and communications capabilities to coordinate them. Offensive systems consist of a "triad" of forces: land-based intercontinental ballistic missiles; submarine-launched ballistic missiles; and manned bombers, along with tanker aircraft to support them. Defensive forces include early warning radars and interceptor aircraft to counter enemy bomber attacks. The Congress provided $14 billion in fiscal year 1981 to operate and modernize these forces.

Debates over strategic budgets are often dominated by assessments of the balance of forces between the United States and the Soviet Union. Perceptions differ widely on the state of the strategic balance, depending on assumptions about which forces should be included in determining the balance, the numbers and capabilities of systems, the survivability of launch platforms, and the vulnerability of command and control systems. Disagreements on some of these points were clear during the debate over the proposed SALT II treaty, which the Senate apparently will not ratify.

Despite lack of consensus on the state of the overall balance, there has been widespread concern about trends in U.S. capabilities. Because of improved Soviet missile accuracy, U.S. land-based missiles may now be vulnerable to a Soviet first-strike attack. 1/ There is also apprehension among some analysts that Soviet missiles could destroy U.S. strategic bombers before they could take off. 2/ For both these reasons, the United States

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1/ "Remarks Prepared for Delivery by Hon. Harold Brown, Secretary of Defense, at the Convocation Ceremonies for the 97th Naval War College Class, Naval War College, Newport, R.I., Wednesday, August 20, 1980," Congressional Record (November 12, 1980), pp. E4917-18.

2/ The Institute of American Relations, Independence Through Military Strength: A Program for Forces to Preserve and



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may no longer have a triad of survivable systems, each providing a hedge against failure of the others.

These concerns have been highlighted by the United States' current strategic doctrine. That doctrine now stresses a wider range of retaliatory options; these include retaliation against Soviet military and command targets, possibly over a prolonged period, along with continued emphasis on immediate and massive retaliation against population centers and economic targets. Some options in the current doctrine, reportedly codified last year in Presidential Directive 59, place a premium on survivable forces that can attack hardened military targets and on a survivable system for command and control.

In response to these concerns, the Congress has begun funding programs that, if fully implemented, would substantially increase U.S. strategic capabilities in the mid-1980s and beyond. These include:

- Continued procurement of new ballistic missile submarines and submarine-launched ballistic missiles;
- Possible procurement of a new manned bomber, plus outfitting of a portion of the existing B-52 bomber fleet with cruise missiles; and
- Development of a new, mobile land-based missile--the MX--to be deployed in a special basing system.

But key issues remain. What improvements, if any, could be made in the U.S. strategic forces over the next few years? By how much might costs of U.S. systems increase because of Soviet responses in a no-SALT world? What would happen if cost constraints or other considerations forced changes in the programs that the Congress has already begun, particularly in the highly controversial progam for basing of the MX missile?

This chapter begins by noting the scope and costs of programs already begun by the Congress. The chapter next addresses some of the remaining key issues, beginning with possible ways to improve near-term strategic capabilities, including:

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Extend American Freedom: 1980-85 (Washington, D.C., February 1980), p. 3.

- Placing more B-52 aircraft on alert;
- Modifying FB-111 aircraft; and
- Placing Minuteman III land-based missiles in a new basing system.

The chapter then discusses options that would improve capabilities in the longer run. These include:

- MX missile system;
- Trident II submarine-based missiles; and
- Tanker programs.

The chapter concludes by discussing improvements in command, control, and communications systems that would affect both near- and longer-term capabilities.

## MODERNIZING STRATEGIC FORCES: CURRENT PLANS

The United States has begun to modernize or alter all three elements of its strategic offensive nuclear triad. For the sea-based segment of the triad, the Congress has funded a new class of submarines, the Trident, that will replace the aging Polaris class and, eventually, all Poseidon submarines as well. The new Trident submarines, as well as 12 Poseidons, will carry the new Trident I missile, whose range and warhead yields exceed those of the current Poseidon missile. The Congress has also continued to fund development of the Trident II missile, which is intended to have greater accuracy and a larger payload at equivalent ranges than the Trident I.

The United States continues to operate its 20-year-old B-52 bomber fleet. The fleet will, however, be provided with the capability to carry newly developed, air-launched cruise missiles, which may increase the effectiveness of air-launched weapons.

In addition, the Congress has provided research and development funds for the introduction of a new manned strategic bomber no later than 1987. One candidate is a derivative of the B-1, the manned bomber program cancelled in 1977. Since much of the technical engineering and research and development has already been completed, a B-1 derivative could be obtained more quickly than a

new-design aircraft. But the derivative might not incorporate the newest technology, including any "stealth" modifications.

Finally, in response to growing evidence of the vulnerability of Minuteman land-based missiles, the Congress has funded development of the MX missile. Larger and more accurate than the Minuteman, the MX is intended to be deployed in a special basing system to enhance its survivability. The Congress has also provided funds for continuing development of new ballistic missile defense technologies that could be used in connection with the MX or other missiles.

All these programs are included in the strategic portion of the CBO baseline (discussed in Chapter II). These programs would substantially increase the costs of the strategic forces in the baseline over the next several years (see Table 4). Costs will grow from $15.6 billion in fiscal year 1981 to $29.1 billion in 1984. 3/ Also, the rate of growth in strategic costs will average about 23 percent a year over the next three years, compared to an annual average growth rate of about 3 percent in the baseline defense budget as a whole.

TABLE 4. BASELINE COSTS OF STRATEGIC FORCES AND REAL GROWTH IN STRATEGIC AND DEFENSE BUDGETS, FISCAL YEARS 1982-1986 (In billions of fiscal year 1982 dollars, annual percentage real increase in parentheses)

| | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|---|---|---|---|---|---|---|
| Strategic Forces Costs | 15.6 | 18.1 | 24.9 | 29.1 | 30.9 | 28.3 |
| Real Growth | | | | | | |
| Strategic forces | — | (16.0) | (37.6) | (16.9) | (6.2) | (-8.4) |
| Defense budget | — | (3.2) | (3.1) | (2.2) | (0.1) | (-3.6) |

3/ Unless otherwise noted, all costs in this report are in constant fiscal year 1982 budget dollars.

## NEAR-TERM IMPROVEMENTS

The Congress has begun many new strategic programs. A few, such as introduction of air-launched cruise missiles and submarine-based Trident I missiles, will add to U.S. strategic capabilities over the next five years. Yet some analysts believe that the status of the U.S.-Soviet strategic balance demands more substantial near-term improvements. These analysts argue that the United States may be, or will soon be, behind the Soviets, at least in terms of some measures of strategic capability. For example, after a Soviet first strike and a U.S. counterstrike, the United States would probably have less remaining "equivalent megatonnage" than the Soviets. 4/ (Equivalent megatonnage measures both the number and size of warheads and adjusts for their capability to destroy targets.) The relative shortfall in equivalent megatonnage would be most severe if the Soviets attacked without warning rather than during a crisis, when U.S. forces would be on alert and thus have a better chance of surviving. This shortfall would be largest in the early 1980s and would gradually disappear as new U.S. systems become operational. Some believe such a shortfall could increase the chances of a Soviet attack during this period of vulnerability, or at least could limit U.S. political options.

On the other hand, other important measures of strategic capability--such as numbers of warheads--do not suggest that the United States is behind the Soviets. Perhaps more important, any shortfall in equivalent megatonnage may be of little significance when considered in the context of the total nuclear and conventional capabilities of the two superpowers.

While the arguments about the importance of near-term strategic improvements remain unresolved, numerous improvements have been suggested and could be debated by the Congress. This section examines the costs and likely schedules of three such options and notes several others.

### More B-52 Aircraft on Alert

The quickest way to enhance U.S. strategic posture is to place a greater portion of existing U.S. bombers on day-to-day

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4/ U.S. Department of Defense, Annual Report, Fiscal Year 1981, p. 125.

"strategic alert." Bombers on alert are fueled, loaded with weapons, and have crews standing by at all times. At present, the Strategic Air Command keeps about 30 percent of its B-52 bombers on strategic alert.

Increasing the numbers on alert would improve U.S. capability against a no-warning strategic nuclear attack by the Soviet Union, since the readiness of alert bombers to take off immediately enhances their chances of surviving a surprise attack. Increasing the alert rate from 30 to 40 percent would, for example, put 480 more weapons on day-to-day alert. 5/ These higher alert rates could be achieved almost immediately, and at little extra cost, by increasing the workload of bomber crews and maintenance personnel.

To avoid risking adverse effects on manpower retention and aircraft maintenance, however, the alert rates would have to be increased more gradually and costs would go up. More funding would be needed to pay for recruiting and training additional air crews and maintenance personnel, procuring larger numbers of spare parts, and increasing total flying hours to maintain crew readiness. If, for example, 40 percent of the newer B-52s (the G and H models) and accompanying tankers were put on alert, costs would rise by a total of $820 million between fiscal years 1982-1986 (see Table 5).

While increased alert rates would improve capabilities against a surprise attack, the change obviously would not improve U.S. capabilities if tensions had already put all forces on alert. Yet such an alert might well precede any nuclear war. (Indeed, planning for conventional forces assumes some warning.) Moreover, increasing alert rates would not add to the overall number of bombers, nor would it provide added capability beyond the life of the B-52 aircraft.

## FB-111 Modification Program

Unlike the B-52 program, an FB-111 modification program would add to overall bomber force capacity once it was completed. It might also provide added capability beyond the life of the B-52s,

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5/ This calculation assumes that all extra B-52s on alert would carry maximum weapons loads.

TABLE 5. INCREASED COSTS ABOVE THE BASELINE OF HIGHER B-52 ALERT RATES, FISCAL YEARS 1982-1986 (In millions of fiscal year 1982 dollars)

| | 1982 | 1983 | 1984 | 1985 | 1986 | Total |
|---|---|---|---|---|---|---|
| Increase B-52 Alert Rates from 30 to 40 Percent | | | | | | |
| B-52G/H cost increase | 30 | 120 | 170 | 120 | 60 | 500 |
| KC-135 tanker support | 30 | 50 | 80 | 80 | 80 | 320 |
| Total | 60 | 170 | 250 | 200 | 140 | 820 |

SOURCES: B-52 alert rates based on data provided to CBO by the U.S. Air Force, October 1979. CBO provided estimates of support costs associated with higher levels of activity in combat units. (The Air Force states that additional nonrecurrent funds would be required for military construction and military family housing. Such estimates are not included here. The table includes only recurrent costs.)

since the FB-111s are newer planes. The plan involves modification both of the 66 FB-111s already operated as strategic bombers and of 89 F-111s now designated as long-range fighters for conventional conflicts. These planes would receive additional fuselage sections and new engines of the type designed for the B-1 bomber, as well as other improvements. This combination of modifications would enable a doubling of the FB-111's weapons capacity from 6 to 12 bombs per aircraft. This increased capacity, plus the addition of 89 more aircraft to the strategic force, would increase the number of weapons, given current day-to-day alert rates, from approximately 110 on today's FB-111 force to approximately 500 on the enlarged force.

Several major reservations apply to the FB-111 proposal, however. The first is its cost—which could equal more than $6 billion in fiscal years 1982-1986. 6/ (The baseline costs of

6/ This cost does not anticipate modification of FB-111s to carry cruise missiles. Yet the Congress requires this capability in a new manned bomber. Thus, costs might have to be increased if modified FB-111s are to meet the Congressional requirement.

strategic forces already include funds for a new manned bomber. Thus, added costs of the FB-111 modification program, which would be an alternative to developing a new manned bomber, would not add to the costs of the baseline.) Furthermore, reassigning the F-111s to the strategic bomber fleet would reduce the number of conventional aircraft capable of long-range missions at a time when such aircraft appear to be a critical requirement for operations over vast regions in the Middle East and Indian Ocean region. Indeed, the Tactical Air Command (TAC)--which operates the conventional fighters--might be reluctant to give up its F-111s, which recently underwent avionics modernization at a cost of more than $130 million. If additional planes were acquired for conventional TAC missions, costs would increase substantially. For example, replacing the 89 F-111s with the same number of F-15 aircraft would add $2.5 billion to costs for the replacement aircraft alone.

Moreover, it might be difficult to modify a significant number of FB-111s within the next five years. Even proponents have suggested that, if begun in fiscal year 1981, the first squadron of modified aircraft would not be available until fiscal year 1984, with program completion in fiscal year 1986. 7/ Particularly if there were any slippage in the schedule, this option might not substantially increase capability over the next five years.

## Minuteman Missiles in MPS Basing

There is great concern about the potential vulnerability of U.S. land-based missiles to a Soviet first-strike attack. One proposed near-term improvement would reduce this vulnerability by putting the latest class of land-based missiles, the Minuteman III, in a multiple protective structure (MPS) basing system. 8/

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7/ Testimony of General Richard Ellis in Department of Defense Authorization for Appropriations for Fiscal Year 1981, Hearings before the Senate Committee on Armed Services, 96:2 (February, March, and April 1980), Part 2, pp. 553, 615. The testimony implied that the first squadron could be on alert in fiscal year 1984 if funds were made available at the beginning of fiscal year 1981.

8/ Independence Through Military Strength, pp. 11-12; Francis P. Hoeber, William Schneider, Jr., Norman Polmar, and Ray

Such a basing system, which is analogous to the one planned for the new MX system, would covertly shuttle Minuteman III missiles among a large number of vertical shelters. (These vertical shelters are concrete-lined holes in the ground that protect the missiles from nuclear blasts.) Because there would be many more shelters than missiles, the Soviets would not know which, at any given time, actually contained missiles. Vulnerability would therefore be reduced, since the Soviets might not have enough warheads to attack all the shelters to ensure that all the missiles were destroyed.

Putting Minuteman III missiles in an MPS basing system would be expensive. Costs for investment alone could total $42 billion over the next ten years, if planners wanted about 1,000 warheads to survive a Soviet first strike. 9/ Costs would be lower if planners settled for fewer surviving warheads. These costs are updated versions of earlier CBO estimates; recent Air Force estimates indicate the cost may be much higher. 10/ Whatever the exact figure, the estimates suggest that the cost of sheltering Minuteman III in an MPS basing system could approach, or even exceed, the $47 billion in investment costs (see Table 6 later

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Bessette, Arms, Men, and Military Budgets: Issues for Fiscal Year 1981 (New York: National Strategy Information Center, 1980), p. 51; questions by Senator Tower in Department of Defense Authorization for Appropriations for Fiscal Year 1981, Hearings, Part 2, pp. 602-3.

9/ This discussion draws upon CBO findings outlined in Congressional Budget Office, The MX Missile and Multiple Protective Structure Basing: Long-Term Budgetary Implications (June 1979). While clearly additions to the baseline, costs of this system are not included in Table 5 because time-phased costs over the next five years are not available. Costs cited above assume that the Minuteman III missiles would be based in the northern United States and use some existing base facilities, even though weather and other factors make this a less attractive deployment area than the Southwest, where the Air Force plans to base the MX missile system.

10/ Costs in the original CBO paper, which is now nearly two years old, were based on an Air Force cost model. The estimating relationships in this model have apparently changed. The numbers cited above were updated by applying

in this chapter) that would be needed to ensure that 1,000 warheads could survive an attack on a proposed MX missile system.

One reason for the high costs is the large number of vertical shelters that would have to be built. Given the deployment of 550 Minuteman III missiles, CBO estimates that about 10,000 shelters would be required to ensure 1,000 surviving warheads. 11/ The large number of shelters is needed because Minuteman III carries only three warheads, whereas MX would carry 10.

Even with these substantial expenditures, it is not clear that Minuteman could be deployed in an MPS basing system within the next five years. Recent Air Force estimates suggest that initial operations could not begin until the late 1980s. Although independent estimates have suggested much earlier dates, these might require a crash program coupled with Congressional waivers of environmental and procurement regulations. Thus, it appears highly uncertain that Minuteman in MPS basing would add to near-term strategic capability.

## Other Options

While the near-term improvements discussed above are among the key ones, they are not the only alternatives available. Other options, which are beyond the scope of this paper, include expanding the program to retrofit more longer-range Trident I missiles into Poseidon submarines, converting Polaris submarines to carry cruise missiles, and modifying SSN-688 attack submarines to carry cruise missiles. The Senate Armed Services Committee

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the ratio of Minuteman to MX costs from the original CBO paper to estimates of MX costs based on the updated Air Force model. Even after this adjustment, recent Air Force estimates of Minuteman MPS basing costs have been higher. One Air Force estimate, when adjusted to achieve comparability with CBO system cost estimates cited above, might total as much as $55 billion for investment alone.

11/ See Congressional Budget Office, The MX Missile and Multiple Protective Structure Basing, for a discussion of costs under other circumstances, such as differing numbers of missiles and warhead levels.

has requested that DoD study these and other options and report to both the House and Senate Armed Services Committees by March 1, 1981. 12/

### Recapitulation: Few Truly Near-Term Improvements Available

Of the options analyzed in this section, only one--increasing B-52 alert rates--would be likely to enhance strategic capabilities in the next few years. Indeed, some options that have been proposed to provide near-term improvements would not add to capabilities in the next few years without extraordinary crash programs.

## LONGER-TERM IMPROVEMENTS

Although there is disagreement about the urgency and type of near-term strategic improvements, there is less disagreement about the need for longer-term modernization. Here the questions center on the long-run costs of the MX missile system and the effects of any change in its basing mode. Questions also arise about the urgency of developing the Trident II missile and about U.S. tanker programs.

### MX Missile System

The Carter Administration accorded highest priority to deployment of the MX missile system, which is currently in full-scale development. The MX system would be substantially different from existing U.S. land-based missile systems, the newest of which is the Minuteman III. The MX missile itself could carry at least ten large warheads, while the Minuteman III could carry only three of the same size. In addition, the MX is expected to employ a far more accurate guidance system, the advanced inertial reference sphere (AIRS), than Minuteman III currently has. Finally, and most importantly, current plans call for basing the MX in a

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12/ See Authorizing Appropriations for Fiscal Year 1981 for Military Procurement, Research and Development, Active Duty, Selected Reserve, and Civilian Personnel Strengths, Civil Defense, and for Other Purposes, S. Rept. 826, 96:2 (June 1980), pp. 103-104.

multiple protective structure (MPS) system. The Air Force plans for 200 MX missiles to be shuttled randomly and covertly among 4,600 horizontal shelters. (These would be concrete structures that would protect the missiles, which would be stored horizontally, from the effects of nuclear detonations.) This system of multiple protective structures would help ensure that some missiles would survive a Soviet first strike, since the Soviets would have to destroy a very large number of shelters in order to destroy all the missiles. The MPS system also is designed to comply with the verification requirements of the SALT II treaty, which the United States has signed but not ratified.

The Air Force plans to have some MX missiles deployed in shelters by fiscal year 1986, with full operating capability projected for calendar year 1989. Yet environmental problems could well cause delays, particularly in the 1986 date for initial operating capability. Moreover, long-run costs could increase substantially. These concerns could force a change in the MPS basing mode.

Environmental Problems. Under current plans, the MX system of shelters and missiles would probably be deployed on public lands in Utah and Nevada. About 8,500 square miles would be involved, though only 25 would be withdrawn from public use. 13/ Members of the Congress and state and local officials have expressed concern about the environmental and socioeconomic effects of the MX system. The system would bring many persons to a sparsely populated area. As many as 25,000 might come during the construction period; 26,000 to 34,000 persons would be permanent residents at operating bases. Such an influx could seriously disrupt local life. The system would also consume substantial quantities of scarce water during construction and might interfere with later use of the land for other purposes. Some of these problems might be avoided or mitigated by federal financial assistance and careful planning. Nonetheless, these issues threaten to delay the MX system and could force a change in its basing mode as well.

Cost Concerns. The MX system will be expensive. A CBO base-case version could cost, over the long run, a total of $47

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13/ Department of the Air Force, MX Deployment Area Selection and Land Withdrawal Acquisition Environmental Impact Statement: Summary (1980), pp. 3-4.

billion for investment alone (see Table 6). 14/ Investment here includes development, procurement, and deployment costs for an MX system with horizontal shelters. Total costs, including operating dollars, would be even higher (see Table 6). The base case, which is used as a reference in the remaining discussion, has 275 missiles and 5,828 horizontal shelters. It was developed to ensure that 1,000 U.S. warheads would survive a Soviet first strike. The Soviet threat in this first strike was estimated using publicly available data. (The Air Force's proposed system differs.) 15/

Costs could, of course, be substantially higher than the $47 billion for the CBO base case, because of delays in the MX schedule or because of unforeseen increases in development, procurement, or construction costs. Costs could also rise if federal payments were required to ameliorate socioeconomic problems in the development area; no such payments are contained in the base-case costs.

Costs could also increase if the Soviet Union increased its own strategic force levels in response to deployment of the MX system. The base case assumes a Soviet threat similar to that which might face MX in the late 1980s. It assumes no special efforts on the part of the Soviet Union to expand its forces. But, particularly in the absence of any strategic arms limitations (such as those in the proposed SALT II treaty), the Soviet threat could grow. The Soviets could, for example, deploy intercontinental ballistic missiles with multiple warheads (known as multiple independently targetable reentry vehicles, or MIRVs) in all their approximately 1,400 silos by 1987; MX is not expected to be completed until calendar year 1989. This could be accomplished

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14/ The discussion that follows is drawn from Congressional Budget Office, SALT II and the Costs of Modernizing U.S. Strategic Forces (September 1979), pp. 18-29; and from Congressional Budget Office, The MX Missile and Multiple Protective Structure Basing, pp. 22-27, 47-50, 131-133.

15/ The Air Force MX system, using goals for surviving warheads and a Soviet threat that are classified, has 200 missiles and 4,600 shelters. The Air Force system would cost about $41 billion for investment alone. (This estimate uses CBO inflators to adjust the Air Force cost estimate, which was stated in 1980 dollars.)

TABLE 6. IMPACT OF CHANGES IN THE NUMBER OF SOVIET WARHEADS ON THE LONG-RUN COSTS OF A U.S. MULTIPLE PROTECTIVE STRUCTURE (MPS) BASING SYSTEM WITH MX MISSILES (In billions of fiscal year 1982 dollars)

| Programs to Achieve 1,000 Surviving Warheads | Soviet Threat | U.S. Response | | U.S. System Cost, Shelters and Missiles a/ | |
|---|---|---|---|---|---|
| | Number of Soviet Warheads | Number of Horizontal Shelters | Number of U.S. MX Missiles | Investment | Total |
| Base Case (820 MIRVed ICBMs) b/ | 5,928 | 5,828 | 275 | 47 | 55 |
| Higher-Threat Cases | | | | | |
| 1,400 MIRVed ICBMs, existing payloads c/ | 9,100 | 9,159 | 350 | 60 | 71 |
| 820 MIRVed ICBMs, fractionation d/ | 15,000 | 15,120 | 400 | 78 | 90 |
| 1,400 MIRVed ICBMs, fractionation e/ | 23,000 | 23,485 | 450 | 106 | 121 |

NOTE: The table assumes U.S. deployment of a racetrack/horizontal shelter basing system for MX. The currently proposed system would use a linear grid system, but this change probably would not significantly alter costs shown above. All of the Soviet warheads shown in the table would not be used to attack a U.S. MPS basing system. Many would be used to attack fixed-based U.S. Minuteman and Titan missile silos. Moreover, it is assumed that only 85 percent of the Soviet missiles used to attack a U.S. MPS basing complex would be reliable. The number of shelters and MX missiles shown for each case represents the combination that would minimize the cost of an MPS basing system designed to provide 1,000 surviving warheads. The cost estimates were derived from the MX Cost Effectiveness Model developed by the Space and Missile Systems Organization of the U.S. Air Force.

a/ "Investment" includes research and development, procurement, and military construction costs. "Total" costs equal investment plus operating and support costs through fiscal year 1999.

b/ Assumes SALT II limit of 820 MIRVed ICBMs and no increase in the number of warheads carried on each missile.

c/ Assumes 1,400 MIRVed ICBMs and no increase in the number of warheads carried on each missile.

d/ Assumes SALT II limit of 820 MIRVed ICBMs and conversion of all missiles to carry larger numbers of 200-kiloton warheads.

e/ Assumes 1,400 MIRVed ICBMs and conversion of all missiles to carry larger numbers of 200-kiloton warheads.

by maintaining the current Soviet production rate of about 125 missiles annually. 16/ Adding these extra MIRVed ICBMs, even without increasing the number of warheads per missile above current levels, would give the Soviets 9,100 warheads on their MIRVed ICBMs. With this level of threat, the cost of an MX system that would ensure 1,000 surviving warheads would increase to $60 billion, or about 30 percent above base-case costs (see Table 6).

Alternatively, the Soviets could maintain the maximum number of MIRVed ICBMs permitted under the proposed SALT II treaty but exceed the treaty limitation on number of warheads per missile by "fractionating" their force (that is, placing a larger number of smaller warheads on each missile). If the Soviets were to fractionate their 820 MIRVed ICBMs in the CBO base-case threat, they could deploy 15,000 warheads (see Table 6). The costs of maintaining the same retaliatory capability of the MX system would then rise to $78 billion, or about 65 percent above the base case. Finally, the Soviets could both increase the number of MIRVed ICBMs and fractionate their payloads, resulting in a total threat of 23,000 warheads. The cost of an MX system that ensured 1,000 surviving warheads after a Soviet first strike would then increase to $106 billion, more than twice that of the base case (see Table 6).

These Soviet improvements would, of course, be expensive for the Soviet Union as well as for the United States. It might be possible to limit the Soviet threat through future arms control agreements, and it might also be possible to limit additional U.S. costs in ways discussed below. Nonetheless, the combination of possible cost increases and environmental concerns could force changes in the MX system, particularly in its basing mode.

Anti-Ballistic Missile Options. The Congress could choose to deploy the currently planned MX missile system. Then, rather than adding more horizontal shelters and MX missiles to counter an increased Soviet threat, the United States might decide to deploy an anti-ballistic missile (ABM) system, which might hold down costs. One concept--a "preferential" defense--would protect only those shelters that actually contained MX missiles. The Low Altitude Defense (LoAD) system--currently in the early stages

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16/ U.S. Department of Defense, Annual Report, Fiscal Year 1981, p. 79.